

REMARKS

Applicants thank the Examiner for extending the courtesy of a telephonic interview with applicant's attorney to discuss this application on February 11, 2003. During the interview, applicants submitted the proposed present amended claims to the Examiner. The Examiner indicated that she believed the amended claims were novel over the Thompson '498 reference but requested that the amendments be presented formally to fully consider obviousness.

In paragraphs 1 and 2 of the Office Action the Examiner rejected Claims 1, 3, 5 and 9-10 under the provisions of 35 U.S.C. 102 (b) as being anticipated by U.S. Patent No. 2,323,498 to Thompson. Reconsideration is respectfully requested.

The present invention as amended herein is directed to a furnace for cracking at least two hydrocarbon feeds to produce olefins, having at least one fired radiant chamber which is divided into at least two separate independent radiant zones by a dividing means. The furnace comprises multiple radiant chambers that have separate independent radiant zones with independent feed tubes, and wherein each separate independent radiant zones temperature can be controlled independently. Moreover, the presently claimed invention is capable of cracking more than one feedstock under different reaction conditions at the same time to produce an entirely different product slate.

Applicants respectfully submit that the present amended Claims are novel and nonobvious over Thompson '498 because Thompson '498 describes the use of a **single inlet manifold (11)** connected to U shaped (9) and parallel conduits (10) allowing for **only one** fluid or gas to pass through the furnace at any given time. Thompson does not provide for an effective and efficient method for independently cracking more than one feed stock at a time. Instead, Thompson describes a simple furnace capable of heating only one fluid or gas in a radiation and/or convection zone.

Specifically, Thompson discloses a furnace that is supplied **by only one feed stock**. No separate independent feed tubes as called for in the present Claims are disclosed or suggested. Even if the Examiner's interpretation of Thompson '498 having separate combustion zone with process coils and conduits (i.e. zones 7 and 7', coils 9 and 9', conduits 10 and 10', respectively) is correct (and Applicants do not concede the point), confirmation that they are supplied by a single feed tube is made

clear in the following descriptions: Fig. 4 which represents a heater similar to those in Figs. 1, 2 and 3, wherein "fluid to be treated is introduced into inlet manifold 20", notably, by **a single feed line to the manifold (20) that diverts the liquid into various** coils and conduit continuously connected (see Fig. 4, and the specification col. 2, lines 50-53); Fig. 5 showing another form of conduit arrangement, describes "fluid to be treated is introduced to the heater through the inlet header 25", conspicuously, **a single feed line** is directed into the header (25) whereby the liquid is diverted into continuously connected conduits and coils (see Fig. 5, and the specification at col. 2, lines 69-72).

Thus, Thompson teaches a furnace to heat **one** fluid or gas at a time. In particular, Thompson teaches the introduction of one fluid or gas into a singular manifold or header which is then divided into a plurality of small streams that flow through the side wall tubes (see Thompson at col. 3, lines 49-55). However, there is no disclosure to use separate and independent process coils or feed tubes for each independent fired radiant zone as called for in the present claims.

In paragraphs 3-6 of the Office Action, the Examiner rejected Claims 2, 4, 8 and 13 under 35 U.S.C. 103(a) as being unpatentably obvious over U.S. Patent No. 2,323,498 to Thompson.

Reconsideration is respectfully requested in view of this amendment.

Further, as more fully set forth above, Thompson does not disclose or suggest in any way a radiant chamber supplied with independent feed tubes for each independent radiant cracking zone as called for in the present claims. Moreover, as recited in newly amended Claim 2, there is absolutely nothing in the Thompson reference to suggest a modification to create a furnace capable of cracking at least four hydrocarbon feeds at different reaction conditions to provide different product slates.

Applicant respectfully submits the inventive use of multiple feeds for cracking numerous hydrocarbons at various conditions within the same furnace **is not** mere duplication of essential working parts. Further, there is no disclosure in Thompson '498 that would provide the motivation to one skilled in the art to subdivide the radiant chambers into separate and independent radiant zones supplied by different feedstock. As such, the reactor described herein can provide greater flexibility whereby multiple feedstocks can be cracked at different reaction conditions.

simultaneously. The present claimed invention unexpectedly meets the needs of the industry by providing a large furnace having separate independent radiant cracking zones, each equipped with its own **independent process coil and temperature control** means.

In view of the lack of any teaching or suggestion of the present claimed invention, applicant urges that Claims 2, 4, 8 and 13 are not rendered unpatentably obvious over the cited reference. Reversal of this rejection is therefore requested.

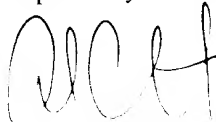
In paragraph 7 of the Office Action, the Examiner rejected Claims 6-7 and 11-12 under 35 U.S.C. 103(a) as being unpatentable over Thompson (2,323,498) in view of Kushch et al. (6,159,001 or 5,711,661). Applicants respectfully traverse the rejection.

For reasons set forth above, Applicants respectfully submit that the Claims as amended herein are not obvious in light of Thompson in view of the Kushch et al. references, because the Kushch et al. references do not teach or suggest, and cannot be construed to teach or suggest, the shortcomings of the Thompson 498 reference discussed above. Accordingly, Applicants respectfully submit that this rejection is overcome.

Applicants note the Examiner's Response to Arguments in paragraph 8 of the Office Action, but respectfully submit that the newly amended claims presented herein render the claims patentable over the art of record.

Based on the above, applicant respectfully submits that all of the pending claims are patentable over the cited prior art and that the rejections of the Examiner are properly reversed. Favorable action is respectfully requested and earnestly solicited.

Respectfully submitted,



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37 C.F.R. 1.121(c)(1)(ii) ATTACHMENT

1. (Twice Amended) A furnace for cracking at least two hydrocarbon [feed] feeds to produce olefins, said furnace comprising:

(a) at least one fired radiant chamber, wherein said radiant chamber is divided into at least two separate independent radiant zones by a fired radiant chamber dividing means;

(b) at least one radiant burner in each said zone of said fired radiant chamber;

(c) a convection chamber in direct communication with said fired radiant chamber;

(d) [at least one independent process coil for each said separate independent radiant zone, wherein each said process coil extends through at least a portion of said convection chamber and extends into one of said separate independent radiant zones before exiting said furnace] at least two independent feed tubes, a first independent feed tube for directing a first hydrocarbon feed through said convection chamber and into a first independent radiant cracking zone and a second independent feed tube for directing a second hydrocarbon feed through said convection chamber and into a second independent radiant cracking zone;

(e) a flue for discharging flue gas located at the top of said convection chamber of said furnace; and

(f) a means for independently controlling the radiant burners in each said separate independent radiant zone comprising regulation of fuel to said radiant burners.

2. (Three Times Amended) A furnace for cracking at least four hydrocarbon [feed] feeds to produce olefins, said furnace comprising:

(a) at least two fired radiant chambers, wherein said fired radiant chamber is divided into at least two separate independent radiant zones by a fired radiant chamber dividing means;

(b) at least one radiant burner in each said zone of said fired radiant chamber;

(c) a convection chamber in direct communication with each said fired radiant chamber;

(d) [at least one independent process coil for each said separate independent radiant zone, wherein each said process coil extends through at least a portion of said convection chamber and extends into one of said separate and independent radiant zones before exiting said furnace] at least four independent feed tubes, a first independent feed tube for directing a first hydrocarbon feed through said convection chamber and into a first independent radiant cracking zone, a second independent feed tube for directing a second hydrocarbon feed through said convection chamber and into a second independent radiant cracking zone, a third independent feed tube for directing a third hydrocarbon feed through said convection chamber and into a third independent radiant cracking zone, and a fourth independent feed tube for directing a fourth hydrocarbon feed through said convection chamber and into a fourth independent cracking zone;

(e) a flue for discharging flue gas located at the top of each said convection chamber of said furnace; and

(f) a means for independently controlling the radiant burners in each said separate independent radiant zone comprising regulation of fuel to said radiant burners.

9. (Amended) An improved pyrolysis cracking furnace having a convection chamber and a radiant cracking chamber wherein said improvement comprises dividing said radiant cracking chamber into at least two separate and independent radiant cracking zones by providing a dividing wall in said radiant cracking chamber, and separately and independently controlling the temperature in each of said separate and independent radiant cracking zones, and providing said cracking furnace with at least two independent feed tubes, a first independent feed tube for directing a first hydrocarbon feed through said convection chamber and into a first independent radiant cracking chamber and a second independent feed tube for directing a second hydrocarbon feed through said convection chamber and into a second radiant cracking chamber.